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ABSTRACT

This instructional packet deals with the study of hematology. It is recommended for all high school students of biology. A general understanding of antigen-antibody reactions is necessary before attempting this learning activity. Behavioral objectives place emphasis on the techniques of and understanding of blood typing. The equipment and materials needed are listed, most of which must be prepared in advance. The student script, student guide (work sheets), and a sample evaluation are all included in the packet. (EB)

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BLOOD TYPING--TECHNIQUE

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A-T TEACHER'S GUIDE

Packet Number - AT 616.07561
J

Subject - Biology

Grade - 10

Level - HML

Prerequisites - A general understanding of antigen-antibody reactions

Behavioral Objectives -

1. Given a slide guide, a lancet, alcohol, and a piece of paper towel, anti-A and anti-B sera, and two toothpicks, the student should be able to determine his own blood type.

2. Given an example of two incompatible blood types, the student should be able to explain the antigen-antibody reaction involved in blood typing.

3. Given a table of blood type reactions, the student should be able to explain the reactions involved in mixing blood of the various types listed.

Equipment and Material - (* = included in packet; ** = must be prepared in advance)

** slide guide (*master and instructions)
** lancets
** Anti-A and Anti-B blood typing sera
** Small bottle of Alcohol 70%
** Small pieces of paper towel (4" x 4" - 1 per student)

Sample Evaluation - See last page of student guide

Space Required - ___X___ carrel _____ other

Bibliography -

Moore, John A. and other, Biological Science, An Inquiry into Life (BSCS Yellow). New York, Harcourt, Brace & World, Inc. 1963.pg.521.

Smallwood, William L. and Green, Edna R., Biology (Teacher's Ed.) Morristown (N.J.), Silver Burdett Co. 1968 pp. 584-586.

STUDENT GUIDE

Blood Typing--Technique

This guide will outline the procedure to use for typing your blood. Use this guide to write any notes or comments you wish to keep from this experience.

At the end of this lesson you:

1. Will be able to type your own blood.
2. Will be able to explain the antigen-antibody reaction involved in the process of blood typing.
3. Will be able to state which types of blood are and are not compatible.
4. Will be able to explain why certain types of blood are not compatible.

Take out a pencil or pen; put on the headphones; turn on the tape player and follow the taped instruction.

I. Antigen-antibody reaction - agglutination.

II. Blook types and their reactions.

Type	Antigen on Cells	Antibody in Serum	As a Recipient of Transfused Blood	
			Compatible with	Reacts with
A	A	Anti-B	A, AB	B, O
B	B	Anti-A	B, AB	A, O
AB	A and B	None	A, B, AB	O
O	None	Anti-A and Anti-B	A, B, AB, O	None

III. Procedure

Step 1. Prepare slide guide.

Step 2. Open lancet package. DO NOT REMOVE LANCET!

Step 3. Clean finger.

Step 4. Lance finger.

Step 5. Drop blood in circles on the card.

Step 6. Drop anti-sera, A on left, B or right.

Step 7. Mix anti-sera with blood.

Step 8. Determine blood type.

Name_____ Period_____

Blood Type_____ Date_____

1. What happens when agglutination occurs?_____

_____

2. What types of blood could you be safely transfused with?_____

_____

3. What types could you not receive?_____

4. Why could you not receive these types or why can you receive all types in case of a transfusion?_____

_____

_____

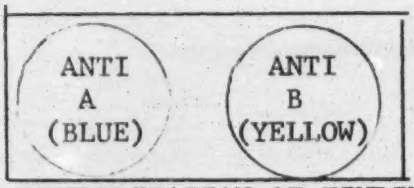
3

SLIDE GUIDE

INTERPRETATION OF FINDINGS:

Clumping with Serum		Blood Group
Anti-A	Anti-B	
-	-	O
+	-	A
-	+	B
+	+	AB

SLIDE GUIDE



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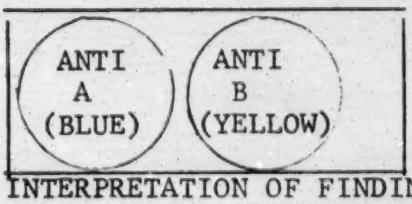

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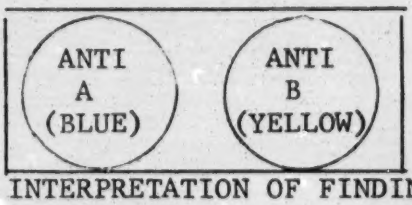

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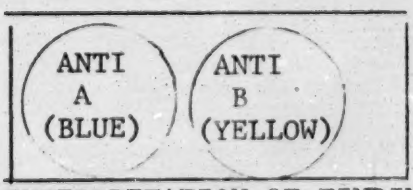

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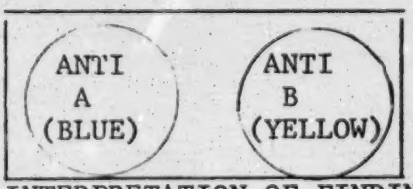

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SCRIPT

Blood Typing--Technique

This is a technique A.T. which will guide you in the proper method to use in typing your own blood.

Before we get into the procedure, let's discuss what happens chemically to make blood types possible. The reaction that occurs when two different types of blood mix is called "agglutination."

Look at picture one, which is a stylized diagram of agglutination. This reaction occurs when antibodies cause antigens to stick together. In blood, the antigens are found on the membranes of the red blood cells. The antibodies are in the serum, or liquid part of the blood. In the picture, the blood cells are represented by red circles and the antibodies are the blue teardrops flowing into the picture.

When two different types of blood mix, the antibodies in the serum of one type cause agglutination of the red blood cells of the other. You can see how dangerous it would be to be transfused with the wrong type of blood. Agglutinated red cells would clog capillaries, causing death.

On the Student Guide, which you are to keep, is a table of the types of blood and how they react when they mix. Take a moment or two to look over this table and relate it to the explanation of agglutination you've just heard. Keep this table handy because you're going to use it after you've typed your own blood.

The procedure you're going to use is quite simple, but it requires certain precautions and does consist of an ordered series of steps which must follow in sequence for your test to be valid. Listen for the full explanation of each step before you do that step. The signal to actually perform each step will be a short interlude of music. When you hear the music, stop the tape and carry out the step as instructed.

You will find the procedure outlines in your Student Guide. Refer to it as we go through the steps.

STEP ONE: You will notice a pile of slide guides on the shelf in the carrel. Take one and place it before you.

STEP TWO: Look at picture two. Do you see how the lancet package is being opened? Open your package in the same way, but leave the lancet in the package. You're opening the package now to make it easier to remove the lancet later, when you won't have full use of your hands.

Look at picture three. This is how your lancet should look, still in the package.

STEP THREE: Take a piece of paper towel, which is provided in the carrel and moisten it with alcohol from the bottle so marked.

Thoroughly clean the finger you've chosen. Many people find it convenient to lance the middle finger of the hand they do not write with. There are a number of reasons for this. One is that it's easier to get a good shot at it because you can hold it between your thumb and index finger. However, the choice is yours. From this point on, don't touch anything with your clean finger - it's sterile.

STEP FOUR: This is the big moment. Take the lancet out of its package and lance the tip of the finger you've just prepared. If you are using a middle finger, a good way to hold it is illustrated in picture four. Notice how the index finger is crossed over the back of the middle finger and the thumb is on the first joint, applying pressure toward the tip. Puncture the tip with a firm, quick stroke. A little pin prick will have no effect and a slow stab will hurt.

That wasn't nearly as bad as you thought it would be, was it?

STEP FIVE: Put the lancet aside and hold the finger over the circles on the slide guide, one circle at a time. Drop a single large drop of blood on each. You might find it necessary to squeeze the blood out with a repeated, rolling, pressing motion of your thumb toward the fingertip. In any case, be sure to hold the finger so that the blood doesn't run down it or under your fingernail. Also, do not touch the slide guide with your finger.

STEP SIX: Wrap your finger with the alcohol saturated paper towel and make a fist, pressing your finger against the palm of your hand. Find the two small dropper bottles labeled anti-A and anti-B. Drop one drop of anti-A serum, which is blue, on the drop of blood in the "A" or left hand circle, and drop one drop of anti B serum on the right hand "B" circle. Do not touch the tip of the dropper to the blood. This will cause false results and you will have to ask your teacher for help. Hold the dropper an inch or so above the slide guide and drop one drop of anti-serum by gently squeezing the rubber bulb.

STEP SEVEN: Get two toothpicks from the box provided and use one to mix the blood and anti-A serum in the left hand circle and the other to mix the blood and anti-B serum in the other circle. Do not use the same toothpick for both.

STEP EIGHT: Look at picture five. The clumping of materials in the circles is what agglutination looks like. Do either of your drops of blood and serum look like this? Use the interpretation of findings chart on your slide guide to determine your own blood type.

Let's run a sample to familiarize you with the method of interpretation. Let's say that your blood reacted and was clumped by anti-A serum but did not clump with anti-B serum. Look down the Interpretation of Findings chart under "anti-A" until you find a plus. In the same line just to the right, you see a minus under "anti-B". This is what you got -- clumping with anti-A, no reaction with anti-B. On the same line, under Blood Group, we find the letter "A". This would be type A blood. Use the same procedure to determine your blood type.

Using what you have just learned, answer the questions at the bottom of the last page of your student guide. When you complete this, you will tear this section off on the dotted line and hand it in to your teacher along with your used lancet which you should bend double at this time.

Finished? O.K. If you have any questions, your teacher will be happy to answer them. Clean up the carrel at this time, making sure that you dispose of the toothpicks and lancet package. You may keep the paper towel if your finger is still bleeding. Otherwise, dispose of it also. Make sure that everything is as you found it, then rewind the tape and you are finished.

STUDENT SUMMARY, OBSERVATION, AND RECORD SHEET